# CLAIM AMENDMENTS

1. **(Currently Amended)** A computer-implemented method comprising:

providing a first texture map for a first portion of a three-dimensional surface, the first texture map being associated with a first mapping technique; [[and]]

providing a second texture map for a second portion of the three-dimensional surface, the second texture map being associated with a second mapping technique that is different from the first mapping technique[[,]];

providing a third texture map for a third portion of the three-dimensional surface, the third texture map being associated with the second mapping technique; and

generating a multiple-component map set that includes at least a portion of the first, and the second and the third texture maps, the first texture map including cylindrical projection information, the second texture map including azimuthal projection information, the third texture map including azimuthal projection information, and the first portion separating the second portion and third portion.

2-3. **(Canceled)**

4. **(Currently Amended)** The method as recited in Claim [[3]] 1, wherein the cylindrical projection information includes plane-chart projection information.

5. **(Currently Amended)** The method as recited in Claim [[3]] 1, wherein the azimuthal projection information includes equidistant projection information.

6. **(Currently Amended)** The method as recited in Claim [[2]] 1, wherein the first and second texture maps are stretch-invariant and have a sampling requirement definable as:

$$M_{capped}\,(\theta) \equiv M_{equi}\,(\theta) + M_{plane}\,(\pi/2 - \theta) \;\; = 4\theta^2 \; + \; 2\pi(\pi/2 - \theta)$$

where $\theta$ is a transition angle from a defined point on the surface to where the second texture map is adjacent to the first texture map.

7. **(Original)** The method as recited in Claim 6, wherein $\theta$ is equal to about 45°.

8. **(Original)** The method as recited in Claim 4, wherein providing the first texture map further includes hexagonally re-parameterizing the cylindrical projection information using a linear transform.

9. **(Original)** The method as recited in Claim 8, wherein the linear transform is definable as:

$$\hat{S}(u, v) \equiv S(V(u, v)')$$

where

$$V \equiv \begin{bmatrix} k & k/2 \\ 0 & 1 \end{bmatrix}$$

and $k \equiv 2\sqrt{3/3}$.

10-13. **(Canceled)**

14. **(Currently Amended)** The method as recited in Claim [[3]] <u>1</u>, wherein the cylindrical projection information includes information selected from at least one type of projection information selected from a group comprising plane-chart projection information, equal area information, and Mercator information.

15. **(Currently Amended)** The method as recited in Claim [[3]] <u>1</u>, wherein the azimuthal projection information includes information selected from at least one type of projection information selected from a group comprising equidistant projection information, stereographic projection information, gnomonic projection information, and equal area projection information.

16. **(Currently Amended)** The method as recited in Claim [[3]] <u>1</u>, wherein the first portion is significantly adjacent to both the first and second portions, such that the first portion separates the second and third portions.

17. **(Original)** The method as recited in Claim 1, wherein the three-dimensional surface is curvilinear.

18. **(Original)** The method as recited in Claim 1, wherein the three-dimensional surface includes a spherical surface.

19. **(Original)** The method as recited in Claim 1, wherein providing the first texture map further includes generating the first texture map using the first mapping

technique, and providing the second texture map further includes generating the second texture map using the second mapping technique.

20. **(Original)** The method as recited in Claim 1, wherein at least one of the first and second texture maps includes information based on a rectangular sampling matrix.

21. **(Original)** The method as recited in Claim 1, wherein at least one of the first and second texture maps includes information based on a hexagonal sampling matrix.

22. **(Currently Amended)** A computer storage device providing computer instructions suitable for performing steps comprising:

providing a first texture map for a first portion of a three-dimensional surface, the first texture map being associated with a first mapping technique; [[and]]

providing a second texture map for a second portion of the three-dimensional surface, the second texture map being associated with a second mapping technique that is different from the first mapping technique[[,]]; and

generating a multiple-component map set that includes at least a portion of the first and the second texture map, the first texture map including at least one of cylindrical projection information or Mercator projection information for the first portion, and the second texture map including at least one of azimuthal projection information or stereographic projection information for the second portion.

23. **(Previously Presented)** The computer storage device as recited in Claim 22, wherein the first texture map includes cylindrical projection information for the first

portion, and the second texture map includes azimuthal projection information for the second portion.

24. **(Currently Amended)** The computer storage device as recited in Claim 23, further comprising computer instructions suitable for performing the step of:

providing a third texture map for a third portion of the three-dimensional surface, the third texture map being associated with the second mapping technique, and wherein the third texture map includes azimuthal projection information for the third portion,

wherein the multiple-component map set is a three-component map set,

wherein the second and third portion are two poles, the first portion is the area between the ~~first~~ second and third portions.

25. **(Previously Presented)** The computer storage device as recited in Claim 24, wherein the cylindrical projection information includes plane-chart projection information.

26. **(Previously Presented)** The computer storage device as recited in Claim 24, wherein the azimuthal projection information includes equidistant projection information.

27. **(Previously Presented)** The computer storage device as recited in Claim 23, wherein the first and second texture maps are stretch-invariant and have a sampling requirement definable as:

$$M_{capped}(\theta) \equiv M_{equi}(\theta) + M_{plane}(\pi/2 - \theta) = 4\theta^2 + 2\pi(\pi/2 - \theta)$$

where $\theta$ is a transition angle from a defined point on the surface to where the second texture map is adjacent to the first texture map.

28. **(Previously Presented)** The computer storage device as recited in Claim 27, wherein $\theta$ is equal to about 45°.

29. **(Previously Presented)** The computer storage device as recited in Claim 25, wherein providing the first texture map further includes means for hexagonally re-parameterizing the cylindrical projection information using a linear transform.

30. **(Previously Presented)** The computer storage device as recited in Claim 29, wherein the linear transform is definable as:

$$\hat{S}(u,v) \equiv S(V(u,v)')$$

where

$$V \equiv \begin{bmatrix} k & k/2 \\ 0 & 1 \end{bmatrix}$$

and $k \equiv 2\sqrt{3/3}$.

31. **(Previously Presented)** The computer storage device as recited in Claim 22, wherein the first texture map includes Mercator projection information for the first portion, and the second texture map includes stereographic projection information for the second portion.

32. **(Previously Presented)** The computer storage device as recited in Claim 31, further comprising computer instructions suitable for performing the step of:

providing a third texture map for a third portion of the three-dimensional surface, the third texture map being associated with the second mapping technique, and wherein the third texture map includes stereographic projection information for the third portion.

33. **(Previously Presented)** The computer storage device as recited in Claim 31, wherein the first and second texture maps are conformal and have a sampling requirement definable as:

$$M_{capped}\,(\theta) \equiv M_{stereo}\,(\theta) + M_{Mercator}\,(\pi/2 - \theta)$$

$$= 16tan^2(\theta/2\,) + \pi\ln\big((1+\cos\theta)/(1-\cos\theta)\big)$$

where $\theta$ is a transition angle from a defined point on the surface to where the second texture map is adjacent to the first texture map.

34. **(Previously Presented)** The computer storage device as recited in Claim 33, wherein $\theta$ is equal to about 47.8°

35. **(Previously Presented)** The computer storage device as recited in Claim 24, wherein the cylindrical projection information includes information selected from at least one type of projection information selected from a group comprising plane-chart projection information, equal area information, and Mercator information.

36. **(Previously Presented)** The computer storage device as recited in Claim 24, wherein the azimuthal projection information includes information selected from at least one type of projection information selected from a group comprising equidistant projection information, stereographic projection information, gnomonic projection information, and equal area projection information.

37. **(Previously Presented)** The computer storage device as recited in Claim 24, wherein the first portion is significantly adjacent to both the first and second portions, such that the first portion separates the second and third portions.

38. **(Previously Presented)** The computer storage device as recited in Claim 22, wherein the three-dimensional surface is curvilinear.

39. **(Previously Presented)** The computer storage device as recited in Claim 22, wherein the three-dimensional surface includes a spherical surface.

40. **(Previously Presented)** The computer storage device as recited in Claim 22, wherein providing the first texture map further includes generating the first texture map using the first mapping technique, and providing the second texture map further includes generating the second texture map using the second mapping technique.

41. **(Previously Presented)** The computer storage device as recited in Claim 22, wherein at least one of the first and second texture maps includes information based on a rectangular sampling matrix.

42. **(Previously Presented)** The computer storage device as recited in Claim 22, wherein at least one of the first and second texture maps includes information based on a hexagonal sampling matrix.

43. **(Currently Amended)** A computing device comprising:

one or more processors;

memory to store computer-program instructions executable by the one or more processors; and

logic module configured to:

provide a first texture map for a first portion of a three-dimensional surface, the first texture map being associated with a first mapping technique and a second texture map for a second portion of the three-dimensional surface, the second texture map being associated with a second mapping technique that is different from the first mapping technique, and

~~the logic module being further configured to~~ output graphically displayable information based on at least a portion of the first and second texture maps, the first texture map including at least one of cylindrical projection information or Mercator projection information for the first portion, and the second texture map including at least one of azimuthal projection information or stereographic projection information for the second portion.

44. **(Previously Presented)** The computing device as recited in Claim 43, wherein the first texture map includes cylindrical projection information for the first

portion, and the second texture map includes azimuthal projection information for the second portion.

45. **(Previously Presented)** The computing device as recited in Claim 44, wherein the logic is further configured to provide a third texture map for a third portion of the three-dimensional surface, the third texture map being associated with the second mapping technique, and wherein the third texture map includes azimuthal projection information for the third portion.

46. **(Previously Presented)** The computing device as recited in Claim 45, wherein the cylindrical projection information includes plane-chart projection information.

47. **(Previously Presented)** The computing device as recited in Claim 45, wherein the azimuthal projection information includes equidistant projection information.

48. **(Previously Presented)** The computing device as recited in Claim 44, wherein the first and second texture maps are stretch-invariant and have a sampling requirement definable as:

$$M_{capped}(\theta) \equiv M_{equi}(\theta) + M_{plane}(\pi/2 - \theta) = 4\theta^2 + 2\pi(\pi/2 - \theta)$$

where $\theta$ is a transition angle from a defined point on the surface to where the second texture map is adjacent to the first texture map.

49. **(Previously Presented)** The computing device as recited in Claim 48, wherein $\theta$ is equal to about 45°.

50. **(Previously Presented)** The computing device as recited in Claim 46, wherein the cylindrical projection information in the first texture map has been hexagonally re-parameterized the using a linear transform.

51. **(Previously Presented)** The computing device as recited in Claim 50, wherein the linear transform is definable as:

$$\hat{S}(u,v) \equiv S(V(u,v)')$$

where

$$V \equiv \begin{bmatrix} k & k/2 \\ 0 & 1 \end{bmatrix}$$

and $k \equiv 2\sqrt{3/3}$.

52. **(Previously Presented)** The computing device as recited in Claim 43, wherein the first texture map includes Mercator projection information for the first portion, and the second texture map includes stereographic projection information for the second portion.

53. **(Previously Presented)** The computing device as recited in Claim 52, wherein the logic is further configured to provide a third texture map for a third portion of the three-dimensional surface, the third texture map being associated with the second

mapping technique, and wherein the third texture map includes stereographic projection information for the third portion.

54. **(Previously Presented)** The computing device as recited in Claim 52, wherein the first and second texture maps are conformal and have a sampling requirement definable as:

$$M_{capped}\,(\theta) \equiv M_{stereo}\,(\theta) + M_{Mercator}\,(\pi/2 - \theta)$$

$$= 16tan^2(\theta/2\,) + \pi\ln\left((1+\cos\theta)/(1-\cos\theta)\right)$$

where $\theta$ is a transition angle from a defined point on the surface to where the second texture map is adjacent to the first texture map.

55. **(Previously Presented)** The computing device as recited in Claim 54, wherein $\theta$ is equal to about 47.8°.

56. **(Previously Presented)** The computing device as recited in Claim 45, wherein the cylindrical projection information includes information selected from at least one type of projection information selected from a group comprising plane-chart projection information, equal area information, and Mercator information.

57. **(Previously Presented)** The computing device as recited in Claim 45, wherein the azimuthal projection information includes information selected from at least one type of projection information selected from a group comprising equidistant projection information, stereographic projection information, gnomonic projection information, and equal area projection information.

58.**(Previously Presented)** The computing device as recited in Claim 45, wherein the first portion is significantly adjacent to both the first and second portions, such that the first portion separates the second and third portions.

59. **(Previously Presented)** The computing device as recited in Claim 43, wherein the three-dimensional surface is curvilinear.

60. **(Previously Presented)** The computing device as recited in Claim 43, wherein the three-dimensional surface includes a spherical surface.

61.**(Previously Presented)** The computing device as recited in Claim 43, wherein the logic is further configured to analyze the texture map per at least one criterion to determine an appropriate texture resolution when providing the first texture map.

62.**(Previously Presented)** The computing device as recited in Claim 43, wherein the logic is further configured to analyze the texture map per at least one metric criterion to determine a requisite number of texture maps in addition to the first texture map when providing the first texture map.

63.**(Previously Presented)** The computing device as recited in Claim 43, wherein at least one of the first and second texture maps includes information based on a rectangular sampling matrix.

64. **(Previously Presented)** The computing device as recited in Claim 43, wherein at least one of the first and second texture maps includes information based on a hexagonal sampling matrix.

65. - 67. **(Canceled)**

68. **(Currently Amended)** A computer-implemented method for generating a low-distortion area-preserving map for use in stochastic ray tracing computer generated graphics, the method comprising:

projecting sampling patterns onto a three-dimensional surface, the projecting the sampling patterns includes a projection, $(u, v) = S^{-1}(x, y, z)$, that is defined by the composition of at least two area-preserving bijections, the at least two area preserving bijections including a first area-preserving bijection that is a mapping from a hemisphere to a disk $(u, v) = (x, y)/\sqrt{1+z}$, and a second area-preserving bijection being a mapping from a disk to a half disk $(\acute{r}, \theta') = (r, \theta/2)$; and

projecting the resulting three-dimensional surface samples into two-dimensional histogram bins.

69. **(Canceled)**

70. **(Original)** The method as recited in Claim 1, wherein providing the first texture map further includes analyzing the texture map per at least one criterion to determine an appropriate texture resolution.

71. **(Original)** The method as recited in Claim 1, wherein providing the first texture map further includes analyzing the texture map per at least one metric criterion to determine a requisite number of texture maps in addition to the first texture map.

72. **(Previously Presented)** The computer storage device as recited in Claim 22, wherein providing the first texture map further includes analyzing the texture map per at least one criterion to determine an appropriate texture resolution.

73. **(Previously Presented)** The computer storage device as recited in Claim 22, wherein providing the first texture map further includes analyzing the texture map per at least one metric criterion to determine a requisite number of texture maps in addition to the first texture map.

74. **(New)** A computer-implemented method comprising:

providing a first texture map for a first portion of a three-dimensional surface, the first texture map being associated with a first mapping technique;

providing a second texture map for a second portion of the three-dimensional surface, the second texture map being associated with a second mapping technique that is different from the first mapping technique, the first texture map including Mercator projection information for the first portion, and the second texture map including stereographic projection information for the second portion;

providing a third texture map for a third portion of the three-dimensional surface, the third texture map being associated with the second mapping technique, and the third texture map including stereographic projection information for the third portion; and

generating a multiple-component map set that includes at least a portion of the first, the second and the third texture map.

75. **(New)** The method as recited in Claim 74, wherein the first and second texture maps are conformal and have a sampling requirement definable as:

$$M_{capped}\,(\theta) \equiv M_{stereo}\,(\theta) + M_{Mercator}\,(\pi/2 - \theta)$$

$$= 16tan^2(\theta/2\,) + \pi\ln\big((1+\cos\theta)/(1-\cos\theta)\big)$$

where $\theta$ is a transition angle from a defined point on the surface to where the second texture map is adjacent to the first texture map.

76. **(New)** The method as recited in Claim 75, wherein $\theta$ is equal to about 47.8°.